

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. APPLN. NO. 09/699,553
ATTORNEY DOCKET NO. Q61563

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (*Currently Amended*) A device for detecting a fixed pattern, said device being fed with received signals with a pattern of a length of N chips, said received signals being obtained on dividing and re-arraying each of K symbols in terms of a chip period as a unit, K being a preset positive integer, each of said symbols being spread with a spread code at a rate of M chips per symbol, M being a preset positive integer, and on repeatedly inserting into the re-arrayed ~~there-arrayed~~ symbols a signature pattern of a length K having one chip period as a unit, by M times, where $N = K \times M$, said signature pattern being detected from said received signal~~signal~~, said device comprising:

first-stage correlators taking correlation between M received signals spaced apart from one another by every K chips, and M spread code sequences obtained on jumping a spread code sequence of a length N by every K th chip to output correlation values associated with K signatures, respectively; and

second-stage correlators taking correlation between the correlation values associated with K signatures output by said first-stage correlators and a pre-defined signature pattern.

2. (*Previously Presented*) The device according to claim 1 wherein said first-stage correlators are each fed with a spread code sequence of a length M obtained on decimating and re-arraying a spread code sequence of a length N generated by a spread code generator at every K chips and classifying the re-arrayed sequence into K to output correlation values associated with K signatures.

3. (*Currently Amended*) The device according to claim 2, wherein
said first-stage correlators comprise K correlator blocks ~~are made up of a plurality of~~
(R+1) correlators of a length M arranged in parallel with one another; and
in each of the correlator blocks, the first correlator of said (R+1) correlators is fed with M received signals every K chips and said spread code sequence to take correlation of a length M, the second correlator is fed with M received signals, at every K chips, having the received signal supplied to the first correlator of said (R+1) correlators as second data, as leading end data, and with a spread code sequence which is said spread code sequence supplied to said first correlator delayed by a delay element in synchronism with an operating period, to take correlation with a length equal to M, such that the (R+1)st correlator is fed with M received signals at every K chips, having the received signal supplied to said (R+1)st correlator as second data, as leading end data, and with a spread code sequence which is said spread code sequence supplied to said first correlator and delayed by R delay elements in synchronism with an operating period, to take correlation with a length equal to M.

4. (*Currently Amended*) The device according to claim 3[[2]] which, in calculating correlation values shifted chip by chip for $N+L$ chips, where L , which is an integer divisible by K , denotes an indefinite time range where there exists said signature pattern wherein each of K correlator blocks has $L/K+1$ correlators of a length M [[,]] and arranged in parallel.

5. (*Currently Amended*) The device according to claim 3[[2]] in which, calculating correlation values shifted chip by chip for $N+L$ chips, where L , which is an integer divisible by K , denotes an indefinite time range during which there exists said signature pattern,[[;]]

wherein each of K correlator blocks has $L/(n \times K) + 1$ correlators of a length M , arranged in parallel, where n is an integer not less than 2 provided that L is divisible by $n \times K$.

6. (*Currently Amended*) A device for detecting a fixed pattern, said device being fed as-a received signal with a pattern of a length of N chips, said received signal being obtained on dividing and re-arraying each of a plurality of ~~θ~~ K symbols in terms of a chip period as a unit, each of said symbols being spread with a spread code at a rate of M chips per symbol, M being a preset positive integer, and on repeatedly inserting into the re-arrayed symbols a signature pattern of a length K having one chip period as a unit, by M times, where $N = K \times M$, said signature pattern being detected from said received signal, said device comprising:

[[(a)]] a received signal storage memory transiently storing received signals for at least $N+L$ chips where L , which is an integer divisible by K , denotes an indefinite time range during which there exists said signature pattern;

[[b]] a spread code generator generating a spread code;

[[c]] a spread code re-arraying unit jumping and re-arraying the spread code generated by said spread code generator;

[[d]] a received signal storage memory controller controlling readout from said received signal storage memory;

[[e]] first-stage correlators comprised of K juxtaposed correlator blocks, each block being of an M chip length;

[[f]] K spread code shift registers storing the spread code sequence re-arrayed by said spread code re-arraying unit to shift-output said spread code sequence to said K correlator blocks, respectively, of said first-stage correlators;

[[g]] each of said correlator blocks of said first-stage correlators being fed with a spread code sequence from the ~~said~~ spread code shift register associated with each of said correlator blocks, each of said correlator blocks outputting a correlation value of the received signal read out from said received signal storage memory and said spread code sequence;

[[h]] a correlation value storage memory storing the correlation value output from said first stage correlators;

[[i]] a correlation value storage memory controller controlling writing of the correlation value output from the first-stage correlators and reading out of the correlation value from said correlation value ~~received signal~~ storage memory;

[[j]] a signature pattern storage unit storing and holding a preset signature pattern;

[[k]] second-stage correlators calculating correlation values between the correlation values read out by said correlation value storage memory controller and said signature pattern stored in said signature pattern storage unit; and

[[l]] a signature detector detecting the signature from the correlation value output from said second-stage correlators to output a fixed pattern detection signal.

7. (*Currently Amended*) The device according to claim 6 which, in calculating correlation values shifted chip by chip for $N+L$ chips, where L , which is an integer divisible by K , denotes an indefinite time range during which there exists said signature pattern, the said-fixed pattern detection device having $L/K+1$ correlators arranged in a juxtaposed fashion, each with a length equal to M , wherein

said $(L/K+1)$ correlators are arrayed in blocks, and

in each of the correlator blocks, the first correlator of said $L/K+1$ correlators is fed with M received signals read out from said received signal storage memory, at every K chips, and said spread code sequence, to take correlation of a length M ; and

the second correlator is fed with M received signals, at every K chips, having the received signal as supplied to said first ~~second~~ correlator as second data, as leading end data, and with a spread code sequence which is ~~is~~ said spread code sequence supplied to said first correlator delayed by a delay element in synchronism with an operating period, to take correlation with a length equal to M , wherein

~~such that the~~ $(L/K+1)$ st correlator is fed with M received signals at every K chips, having the received signal as supplied to the L/Kth correlator as second data, as leading end data, and with a spread code sequence which is said spread code sequence supplied to said first correlator and delayed by L/K delay elements in synchronism with an operating period, to take correlation with a length equal to M.

8. (*Currently Amended*) The device according to claim 6 wherein each said K correlator blocks is made up of a plurality of $(R+1)$ correlators, each of a length M, arranged in parallel with one another;

in each of said correlator blocks, the first correlator of said $(R+1)$ correlators is fed with M received signals at every K chips and said spread code sequence as read out from said received signal storage memory to take correlation of a length M; and

the second correlator is fed with M received signals, at every K chips, having the received signal as supplied to said ~~first~~ second correlator as second data, as leading end data, and with a spread code sequence which is said spread code sequence supplied to said first correlator from the spread code register and delayed by a delay element in synchronism with an operating period, to take correlation with a length equal to $M_1[[:]]$ wherein

~~such that the~~ $(R+1)$ st correlator is fed with M received signals at every K chips, having the received signal supplied to said Rth correlator as second data, as leading end data, and with a spread code sequence which is said spread code sequence supplied to said first correlator and

delayed by R delay elements in synchronism with an operating period, to take correlation with a length equal to M.

9. (*Previously Presented*) The device according to claim 8 wherein each of said K correlator blocks has $L/(n \times K)+1$ correlators arranged in parallel, where n is such an integer which is not less than 2 and which renders L divisible by $n \times K$.

10. (*Currently Amended*) The device according to claim 8 in which, in calculating correlation values shifted chip by chip for N+L chips, where L, which is an integer divisible by K, denotes an L chip range that is an indefinite time range during which there exists said signature pattern, ~~processing of~~ calculating the correlation values in said K correlator blocks is ~~repeated for each received signal belonging to a section obtained by on-dividing said L into plural portions,~~ to obtain correlation values in an N+L chip range.

11. (*Previously Presented*) The device according to claim 6 wherein a plurality of said second stage correlators are provided in association with plural sorts of signature patterns.

12. (*Currently Amended*) The device according to claim 6 wherein said spread code re-arraying unit is configured for variably re-arraying the spread code generated in said spread code generator responsive to the re-arraying state of said signature pattern for distribution to said K ~~plural~~ spread code shift registers.

13. (*Currently Amended*) A CDMA reception apparatus comprising the device for detecting a ~~having the fixed pattern detection device as claimed defined in claim 1.~~

14. (*Currently Amended*) A ~~In a~~ spread spectrum communication apparatus[[,]]
comprising a detection device for detecting a signature pattern from a received signal, said detection device being fed with received signals with a pattern of a length of N chips, wherein signature pattern of a length K with a one-chip period as a unit is repeatedly inserted M times, said signature pattern, being obtained on dividing and re-arraying each signature of K symbols each being spread with the spread code at a rate of M chips per symbol, said device ~~in the spread spectrum communication apparatus~~ comprising:

first-stage correlators taking correlation between M received signals spaced apart from one another at every K chips, and M spread code sequences obtained on decimating a spread code sequence of a length N at every K chips to output correlation values associated with K signatures; and

second-stage correlators taking correlation between the correlation values associated with K signatures output by said first-stage correlators and a pre-defined signature pattern.